Makings of the Cell Membrane

**Teacher:** Mr. Rowe

**Grade:** 8th Grade Biology

**Sunshine State Standard:**

SC.912.L.14.2: Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).

SC.912.L.18.3: Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.

**Rational:**

Studying the cell membrane allows us to identify blood types. This has helped us save many lives with blood transfusions.

**Objective:**

* The students will be able to identify the parts of the cell membrane.
* Students will also be able to explain why the lipids of the cell membrane are both hydrophobic and hydrophilic.

**Content Outline:**

1. What is the function of the cell membrane?
   1. Provide structure
   2. Provide protection
2. What makes up the cell membrane?
   1. Lipids (fats)
      1. Major lipid is the phospholipids
         1. Two major parts
            1. Hydrophilic head

Attracts water

* + - * 1. Hydrophobic tails

Repels water

* + 1. Forms two layers
       1. Hydrophobic tails face each other creating a bi-layer that makes up most of the cell membrane
       2. Hydrophilic heads face the inside and outside of the cell.
          1. Locations where water can be found.
    2. Another lipid found in the bi-layer is cholesterol.
  1. Proteins
     1. Found throughout the cell membrane.
     2. Can be found in three different ways.
        1. Crosses both layers of the cell membrane.
           1. Help transport certain materials across the cell membrane.
           2. Transmembrane proteins
        2. Crosses only one layer of the cell membrane.
           1. Integral protein
        3. Proteins that are found on the outside of the cell membrane.
           1. Peripheral protein
           2. Glycoproteins are proteins have carbohydrates attached to them.
           3. Glycoproteins help with the cell to cell interaction.
     3. Made up of amino acids
        1. There are 20 natural amino acids in life
  2. Carbohydrates
     1. Made up of many different sugars
     2. Found on the outside of the cell membrane
        1. Forms markers on the cells that identify the cell.
           1. These markers or also known as glycolipids.
        2. Reason for why we have blood types
  3. Fluid mosaic model
     1. Accepted form of the cell membrane

**Procedure:**

Day 1:

* Prep-time (5 min)
  + Sharpen pencils, put books away
* Formative Assessment (30 – 40 min)
* Post test
  + Read silently

Day 2:

* Bell work: What do you know about the cell membrane? What do you think it is made up of? Why do you think we study the cell membrane? (5 min)
* Go over bell work (5 min)
* Hand out guided notes. (1 min)
* Lecture (20 – 30 min)
* Practice identifying parts of the cell membrane (10 – 20 min)

Day 3:

* Bell work: Identify the three parts of the cell membrane (5 min)
* Cell membrane transport activity (40 min)

**Assessment:**

* Students will be assessed in several ways
  + Participation
    - Guided notes will be checked as lecture is occurring.
    - Students participating in the activity

# Bibliography

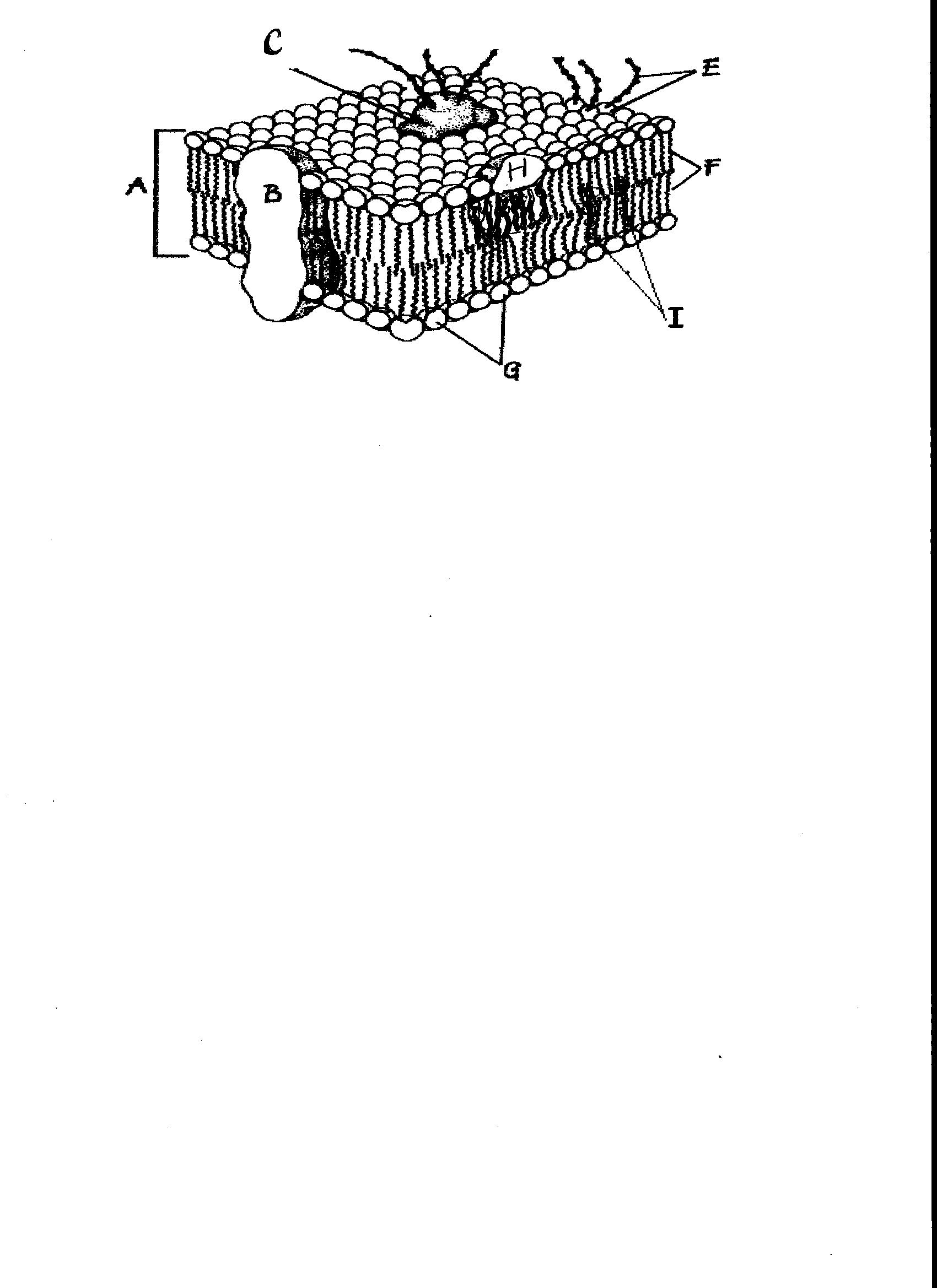
*Biology Junction.* (n.d.). Retrieved April 04, 2011, from Biology Junction Web Site: www.biologyjunction.com/cell%20membrane%20coloring%20worksheet.doc

NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ DATE\_\_\_\_\_\_\_\_\_ PERIOD\_\_\_\_\_\_\_\_\_

**Cell Membrane Coloring Worksheet**

Correctly ***color code and identify*** the name for each part of the cell membrane.

|  |  |  |  |
| --- | --- | --- | --- |
| **Letter** | **Name/Color** | **Letter** | **Name/Color** |
| \_\_\_\_\_ | Phospholipid bilayer (no color) | \_\_\_\_\_ | Peripheral protein (red) |
| \_\_\_\_\_ | Integral protein (pink) | \_\_\_\_\_ | Cholesterol (blue) |
| \_\_\_\_\_ | Fatty acid tails (orange) | \_\_\_\_\_ | Glycoprotein (green) |
| \_\_\_\_\_ | Phosphate heads (yellow) | \_\_\_\_\_ | Glycolipids (purple) |



***Match*** the cell membrane structure or its function with the correct letter from the cell membrane diagram.

|  |  |  |  |
| --- | --- | --- | --- |
| **Letter** | **Structure/Function** | **Letter** | **Structure/Function** |
| \_\_\_\_\_ | **Attracts water** | **\_\_\_\_\_** | **Repels water** |
| \_\_\_\_\_ | **Helps maintain flexibility of membrane** | **\_\_\_\_\_** | **Make up the bilayer** |
| \_\_\_\_\_ | **Involved in cell-to-cell recognition** | **\_\_\_\_\_** | **Help transport certain materials across the cell membrane** |

**Lab:**

**Standards:**

SC.912.L.14.2: Relate structure to function for the components of plant and animal cells. Explain the role of cell membranes as a highly selective barrier (passive and active transport).

SC.912.L.18.3: Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes.

**Objective:**

The students will start to see that molecules move across the cell membrane in specific pathways or by passive transport.

**Supplies:**

* Students
* A few small soft balls (represents small molecules like water)
* A few medium soft balls (represents medium molecules like salts)
* 1 or 2 large soft balls (represents large molecules like sugar)
* (Talk to your Physical education teachers and see if they have these materials) If not then you can get them at Wal-mart or a thrift shop for about $30.00

**Activity:**

* Students will be lined up in two rows approximately 10 feet apart one row will represent the cell membrane and the other row will represent the particles outside the cell membrane.
* The row of particles outside the cell membrane will be throwing the small and medium balls softly through the legs and arms of the students representing the cell membrane.
* Identify two or four students with a note card necklace as transport proteins, these students will be the only ones who can throw the large balls.
* Have the particle students throw their molecules at the cell membrane, the membrane students will try to catch as many molecules that are trying to pass through, this represent the semi-permeable state of the cell membrane.
* Rotate your students till all have been both the membrane and the throwers.

**Hazards:**

1. Students throwing balls at other students heads.
2. Depending on where the lab is conducted (within the classroom or outside) corresponding hazards. Within the classroom, moving desks and chairs, wiring from electronics (tripping or falling), and etc. Or if conducted outside there are possible grass or pollen allergies, insect allergies, holes (tripping or falling), and etc.

**Questions:**

1. Which balls were easiest to get to the other side of the cell membrane? Why?
2. Which balls were the hardest to get to the other side of the cell membrane? Why?
3. Of what you know about the cell membrane identify who was the lipids and who was the proteins? How did you know this?

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_

* Cell membrane
* Fluid mosaic model
  + Accepted form of the cell membrane
* What is the function of the cell membrane?
  + Provide \_\_\_\_\_\_\_\_\_\_\_
  + Provide **\_\_\_\_\_\_\_\_\_\_\_**
    - Resist the pressures of osmotic pressure
* What makes up the cell membrane?
  + **\_\_\_\_\_\_\_\_\_\_** (fats)
  + **\_\_\_\_\_\_\_\_\_\_\_**
  + **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**
* Lipids (fats)
  + Major lipid is the phospholipids
    - Two major parts
      * **\_\_\_\_\_\_\_\_\_\_\_\_** head
        + Attracts water
      * **\_\_\_\_\_\_\_\_\_\_\_\_** tails
        + Repels water
  + Forms two layers
    - Hydrophobic tails face each other creating a **\_\_\_\_\_\_\_\_\_** that makes up most of the cell membrane
  + Hydrophilic heads face the inside and outside of the cell.
    - Locations where water can be found.
  + Another lipid found in the bi-layer is cholesterol.
* Proteins
  + Found throughout the cell membrane.
  + Can be found in **\_\_\_\_\_\_\_\_** different ways.
    - Crosses **\_\_\_\_\_\_\_** layers of the cell membrane.
      * **\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_** certain **\_\_\_\_\_\_** across the cell membrane.
      * **\_\_\_\_\_\_\_\_\_\_\_\_\_** proteins
    - Crosses only **\_\_\_\_\_\_\_ \_\_\_\_\_\_\_** of the cell membrane.
      * **\_\_\_\_\_\_\_\_\_\_\_** protein
    - Proteins that are found on the **\_\_\_\_\_\_\_\_\_\_\_** of the cell membrane.
      * **\_\_\_\_\_\_\_\_\_\_\_\_** protein
      * Glycoproteins are proteins have carbohydrates attached to them.
        + Glycoproteins help with the cell to cell interaction.
  + Made up of amino acids
    - There are 20 natural amino acids in life
* Carbohydrates
  + Made up of **\_\_\_\_\_\_\_\_** different **\_\_\_\_\_\_\_\_\_\_**
  + Found on the outside of the cell membrane
  + Forms markers on the cells that help **\_\_\_\_\_\_\_\_\_\_\_** the cell.
    - These markers or also known as glycolipids.
  + Reason for why we have blood types